into or withdrawn from each circuit with as little disturbance as possible to the current in that circuit. To do this without the complications of switches or arrangements of binding screws, the very simple plan of terminals, shown in Fig. 3, has been adopted. The ends of the copper strip forming the coil are brought out horizontally behind the instrument, one above the other, with a thin piece of wood between them for insulator. On one end of the leads for attachment to these terminals is a spring clip, formed of two stout strips of copper, one attached to each lead, kept apart for a short distance along their length by a thickish piece of wood, and held in their places by a serving of waxed cord at that place. The ends of the copper strips project beyond the separating piece of wood about two or three inches, and are bent round into similar curves, with their convexities turned towards one another. They have sufficient spring to bring their convex portions into contact, but they are held together at that place by a stout india-rubber band passed round a groove in the edges of the two semicircular pieces soldered on the backs of the strips. The points, however, of the strips are a little distance apart. If, now, the clip just described be pushed over the terminals of the coil, the jaws of the clip will be separated, but before separation takes place each of them has come into contact with a terminal of the coil. Hence if the leads form part of a galvanic circuit, the current, before the galvanometer is attached, passes from one lead to the other across the jaws of the clips, and after these have been separated, through the galvanometer coil; and it is plain that no cessation of the current, and in practical cases only an infinitesimal disturbance can be caused by introducing the galvanometer. Sparks are thus altogether avoided, and the galvanometer is included in the circuit by a single simple and sure operation. When the leads are withdrawn from the coil-terminals the action is simply the reverse, the jaws of the clip have come together at their convexities before the terminals of the coil have lost contact with them.

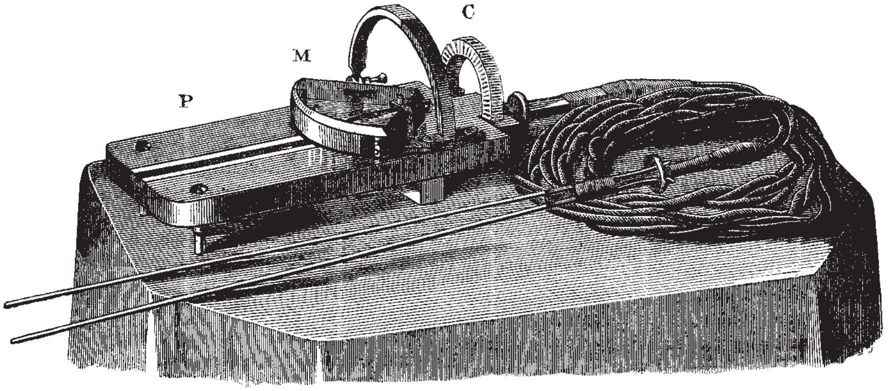

Fig. 3.

In practice two stout wires which have one pair of ends attached to one of these spring clips are included in each circuit, the current in which is to be measured by the galvanometer. The instrument is placed with its leads attached to its terminals in a convenient position, so that the free end of the leads may reach easily the spring clips of all the circuits. The terminals at that end are similar to those of the galvanometer. They can therefore be pushed in between the jaws of each clip to allow the current to be read off, and withdrawn without disturbing the current in the circuit. The leads are shown attached at one end by their spring clip to the galvanometer, and at the other end to a spring clip supposed included by means of the two straight pieces of wire in a galvanic circuit.

This arrangement is exceedingly useful for a great number of purposes, as for example for measuring the currents charging secondary cells, or flowing through the various parts of an electric lighting circuit, or for measuring the whole current sent into the circuit by the dynamo or generator.

ANDREW GRAY

NOTES

THE German Association began its proceedings on Monday at Eisenach, when Prof. Haeckel delivered a lecture on the interpretation of nature by Darwin, Goethe, and Lamarck. The attendance at the meeting amounted to about 1000.

THE autumn meeting of the Iron and Steel Institute was opened on Tuesday at Vienna in the great hall of the Vienna Ingenieur und Architekten Verein. In the absence of the president, Mr. Josiah Smith, the vice-president of the Institute, Mr. I. Lowthian Bell, took the chair. The British and other foreign guests were then welcomed, in the name of the Government, by Baron Possinger, the Governor of the province of Lower Austria, and in the name of the city by the burgomaster. Mr. Bernhard Samuelson, M.P., of Banbury, was chosen president of the Institute for the next two years. The place of next year's Congress it was decided should be London. The Congress next proceeded with the reading of the papers set down for the day. After this work was concluded, the Members were conveyed by steamer down the Danube to inspect the works which have been commenced by the Vienna Corporation for improving the navigation of the river. Thence the guests were taken to Nussdorf, and proceeded to the top of the Kahlenberg, a hill in the vicinity. The first day was wound up by a banquet, at which the guests were entertained by the municipal authorities of Vienna. The present is the fourth meeting which the Institute has held upon the Continent, it having met at Liège in 1873, at Paris in 1878, and at Dusseldorf in 1880. The number of guests from abroad is nearly three hundred. They include not only Members of the English Institute, but visitors from America, Germany, France, Belgium, Spain, and Russia. The business portion of this autumn's Congress is expected to occupy three days, but fully a week will be spent in excursions and other festivities, and in visits to the chief ironworks and mines of Austria and Hungary.

M. BARTHELEMY ST. HILAIRE has completed the translation of Aristotle's "History of Animals," which will be published shortly by Baillière, and will extend to four volumes 8vo, with preface, notes, and commentary. The learned senator delivered last Saturday before the Academy of Moral and Political Science, of which he is a member, a lecture on his translation, showing that in this work, executed after numerous dissections of animals sent to him by Alexander, the great philosopher exhibited a penetration of mind which had been unsurpassed in his other treatises, and had been praised by Buffon and Cuvier. M. Barthelemy St. Hilaire contends that the descriptions were originally accompanied by illustrations, to which numerous allusions are made in the text.

The inventory of the fortune left by the late M. Giffard has been completed. The whole amounts to about 7 million francs; 2 milions are devoted to legacies, and the other 5 are bequeathed to the French Government to be spent in foundations useful for the promotion of knowledge. No decision will be taken by the Government before the Council of State has given an opinion on the question of accepting the legacy. The same formality will be complied with even for the sum of 50,000 francs which has been bequeathed to the Academy of Science, as well as to the Société des Amis des Sciences, and Société d'Encouragement. But it has been suggested that the 5 millions should be employed in the foundation of a "Caisse Giffard" for the help of inventors in their discoveries.

The Dutch Society of Sciences, at Harlem, recently awarded gold medals to Herr Neumayer, of the Hamburg Maritime Observatory, and Herr Buijs-Ballot, of the Utrecht Meteorological Institute, for eminent services in meteorology. The prize-subjects for the current year (to January 1, 1883) are briefly these:—(1) Influence of light on the electric conducting power of selenium; are other electric properties also modified, and other matters similarly influenced by light? (2) Chemical relations of the principal elements of the bile. (3) Chemical relations of terpenes. (4) Influence of structure and elasticity on the compound tone (the timbre) of sonorous bodies. (5) Examination of Clerk-Maxwell's theory of the electric medium, and its relations to the electro-magnetic theory of light. (6) Decomposition of organic matters in bare ground, and ground covered with vegetation. (7) Origin of the mesoderm in vertebrates. (2) Development of one or several species of annelids. (9) Ditto of echinoderms. For the following year (to January 1, 1884):—(1) Nature and composition of the *Terpen* of Friesland and Groningen, their animal and plant remains, &c. (2) Mariners' compasses and the means used to remedy the effects of oscillations and trepidations of the ship, also of the ship's iron. (3) Intensity of the light emitted in different directions from surfaces reflecting light by diffusion, and those emitting proper light; law of dependence of this intensity on the angle of emission and the nature of the luminous surface. (4) Change of refrangibility of light through motion of the luminous source or the refringent medium. (5) Structure of the kidneys of mammalia, specially as regards the epithelial lining in the different subdivisions of the renal tubes. (6) Condensations of different gases on the surface of solid bodies at different temperatures. (7) Study of the (probable) explanation of many physical and chemical phenomena by motions of particles of a system about a state of equilibrium. (8) Peripheric nervous system of various osseous fishes. (9) History of the development of one or several species of Lamellibranchs. (10) The phenomena of electric discharge in rarefied gases. The prize offered, in each case, is (at the author's option) either a gold medal or a sum of 150 florins; a supplementary premium of 150 florins may be given if the memoir be thought to deserve it. Memoirs to be written in Dutch, French, Latin, English, Italian, or German, and sent to the Secretary in the usual way.

A series of researches having been undertaken by several Russian physicians as to colour-blindness, Dr. Kolbe has just published in the newspaper *Vrach* (*The Physician*) the results. Out of 10,828 railway servants examined, no less than 251 were colour-blind, and 32 proved to have an imperfect capacity for distinguishing colours. The average percentage of colour-blind would thus be 2·6; but the five doctors who have made these investigations arrived at very different percentages, namely, from 0·85 to 5 per cent. Three other doctors have made experiments on sailors and pupils in naval schools and have found a much higher percentage—6·08 per cent. of colour-blind, and 8·5 with imperfect vision. Among scholars of naval schools the percentage of colour-blind is however smaller, that is, 1·6 and 1·95. Women are subject to a far smaller extent to colour-blindness. Thus, Dr. Kolbe, who has experimented both on men and women, discovered among the men 2·5 per cent. of colour-blind and 7·5 with imperfect vision, whilst among women he has discovered only 0·16 per cent. of colour-blind and 3 per cent. with imperfect colour vision.

At King's College, London, a course of lectures on Agriculture will be given during the ensuing winter by Mr. Frederick James Lloyd, F.C.S., of the Royal Agricultural Society of England. The lectures will be given on Thursday evenings at 6 p.m., beginning October 12.

Under the title of *Timehri* the Royal Agricultural and Commercial Society of British Guiana have begun the issue of a half-yearly journal edited by Mr. E. F. Im Thurn. The journal, however, is not to be devoted solely to agriculture and commerce, but is intended as a record of all important work bearing on the scientific exploration of the colony. Such a permanent record will be of the greatest utility, and under Mr. Im Thurm's care we may expect some valuable contributions to science. Among the articles in the first number are:—"Tame Animals among the Red Men of America," by the editor; and "Note on a Journey up the Cuyuni," by Mr. J. S. Blake. The term *Timehri*, we may say, is a Carib word, and denotes those curious hieroglyphics found so plentifully on the rocks of British Guiana.

In the new number of the New Zealand *Journal of Science*, Mr. A. K. Newman advocates the formation of a New Zealand Association of Science similar to the British Association. We are glad to see any effort to promote science in our colonies, though we should have thought that the New Zealand Institute, combined with the *Journal of Science* itself, would render any such Association superfluous. But why not attempt the formation of an Australasian Association?

The annual Conference of delegates from scientific societies was held at Southampton during the meeting of the British Association. Efforts have been made to enlist the co-operation of local societies all over the kingdom, and obtain their aid in carrying out the work of several of the British Association Committees, but so far, we regret to see, not with much success. Still the Conference is capable of doing good work, and we hope will continue its efforts.

An International Electrical Exhibition has been opened at Munich.

Messrs. Cassell, Petter, and Galpin have issued Part I. vol. ii. of the Encyclopædic Dictionary, extending from Cable to Conarum. It seems to us to be in all respects up to the standard of the first volume, noticed by us some time since.

Under the title of "Brehm's Zoological Atlas," Mr. T. R. Johnston of Edinburgh has brought together the leading illustrations to Brehm's well-known "Thierleben." As an aid to the teaching of the subject the Atlas will be found really serviceable, and will be especially interesting to children and useful in leading them to take an interest in science.

WE have received a further supply of University Calendars. That of University College, Liverpool, is pleasant reading in some parts; the list of donations and subscriptions to the young college is quite worthy of Liverpool, and might well excite the envy of more struggling institutions. Here we have 10,000*l.* for a Chair of Natural History, another 10,000*l.* for a Chair of Chemistry, and the like sums or nearly so, for Chairs of Philosophy, of Art, of Mathematics, for a chemical laboratory, and so on, besides thousand on thousand for other purposes. Liverpool College has had a good start, and much will be expected of her. The Calendar of Firth College, Sheffield, is small and business-like, and in the statement of the objects of the college, the governors show that they have a satisfactory idea of what such an institution should be and do. We have also the Calendar of University College, Wales, in whose curriculum science has a place.

TWO interesting cases of explosion are described by Herr Pfaundler in a recent number of Wiedemann's *Annalen.* A closed glass tube two-thirds filled with liquid carbonic acid was inserted a few centimetres deep in a bath of carbonic acid and ether brought to a temperature of − 100° C., in order to get crystallised carbonic acid. Beautiful crystals were soon formed in the immersed part of the tube, and a layer of the liquid acid remained above. The tube was then raised by its upper part into the air, and in a few minutes it exploded violently. This tube had often before borne a rise of temperature to 31°. The explosion is attributed to thermal expansion of the solid carbonic acid (as a more likely cause, than vapour-pressure on glass rendered brittle by a low temperature). In the second case, a large sheet zinc bell-gasometer, used exclusively for keeping oxygen gas, was concerned. It had stood about six months unused, containing a little of the gas. When the issuing gas was being tested with a glowing match, an explosion occurred, shattering the apparatus. Any entrance of hydrogen or coal-gas is out of the question. It is supposed that the water had gradually absorbed acid vapours from the air of the laboratory, and that the zinc had been thus attacked, yielding hydrogen. The zinc was in fact somewhat corroded. It is recommended that the zinc in such cases be coated with a lac.

IN a recent communication to the *Rivista Scientifico-Industriale,* Prof. Palmieri concludes from experiments (1) that glycerine in contact with an ammoniacal nitrate of silver solution partially reduces the metal in the cold state, and with heat the reduction is more pronounced, and gives the appearance of a metallic mirror; (2) that with addition of a solution of caustic potash, either in the cold or hot state, complete reduction is produced, with a most brilliant metallic mirror; (3) that some substances accelerate the reduction, such as alcohol and ether; and (4) that, operating in the cold state and in darkness, the reduction is more brilliant and rapid that when operating in light. On the whole it appears that the reducing action referred to may be applied industrially with advantage to the silvering of mirrors, both on account of the facility of the process and its economy. The exact proportion of the components is important, and Prof. Palmieri promises particulars shortly.

A SIMPLE anemoscope and anemometer, designed by the Brothers Brassart of Rome, at the instance of Prof. Tacchini, especially for use in meteorological stations of small resource, is described in the *Riv. Sci. Ind.* (Nos 12-13). The chief peculiarity in both instruments is the system of free transmission, obviating prejudice to the indications from changes of temperature; the axis has several universal joints in its course, and in the case of the anemoscope passes down freely through a central hole in the plate bearing the compass card, a weight being hung at the end of it. It carries an index just over the card. In the anemometer the weighted axis has a perpetual screw acting on a toothed wheel, which, by means of a system of jointed rods, actuates three discs having peripheral numbers, in such a way as to present a numerical record of the wind's velocity in a given time. About forty of these anemoscopes and anemometers are now at work at various Italian stations.

EXPERIMENTS have been recently made in Rome by Signors Capranica and Colasanti regarding the action of oxygenated water on the system. Physiologically absorbed (according to Hueter's method) the substance acts as a poison, quickly killing animals, the fatal dose varying with the animal's size (about 25 cc., is enough for a dog weighing 3 kgms., 75 cc. for one weighing 13 kgms.). The poisonous action appears in all the great functions of the body, especially that of the spinal cord; the excito-motor power of that organ is over-excited, as shown by convulsive phenomena (tetanus, locomotor ataxy, &c.). The physico-chemical acts of nutrition are also profoundly disturbed, as is proved by the very pronounced glycosuria previous to death. All these disturbances are attributable to decomposition of the H_2O_2 in contact with the tissues. The consecutive phenomena in poison with oxygenated water are identical (the authors say) with those M. Bert has observed as resulting from the action of compressed oxygen.

THE additions to the Zoological Society's Gardens during the past week include a Chacma Baboon (*Cynocephalus porcarius* ♀) from South Africa, presented by Mr. H. Banfield; a Moustache Monkey (*Cercopithecus cephus*) from West Africa, presented by Mrs. Heath; two Macaque Monkeys (*Macacus cynomolgus* ♂ ♀) from India, presented by Mr. F. J. Newton; a Great Anteater (*Myrmecophaga jubata* ♀) from Parana, presented by Sir William Wiseman, R.N.; a Vulpine Phalanger (*Phalangista vulpina* ♂) from Australia, presented by Mr. W. Marston Clark; three Gold Pheasants (*Thaumalea picta* ♂ ♂ ♀), six Bamboo Partridges (*Bambusicola thoracia*), a Common Moorhen (*Gallinula chloropus*) from China, a Black Kite (*Milvus migrams*), captured in the Red Sea, presented by Mr. Theodore A. W. Hance; a Horned Lizard (*Phrynosoma cornutum*) from Texas, presented by Mr. W. Pilcher; a Squirrel Monkey (*Chrysothrix sciurea* ♂) from Brazil, a Ring-tailed Coati (*Nasua rufa*) from South America, deposited; a tiger (*Felis tigris* ♂) from India, two White-eared Conures (*Conurus leucotis*) from Brazil, two Dusky Parrots (*Pionus violaceus*) from Venezuela, a Horned Parrakeet (*Nymphicus cornutus* ♀) from New Caledonia, received in exchange; a Wapiti Deer (*Cervus canadensis* ♀), a Geoffroy's Dove (*Peristera geoffroii* ♀), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

COMETARY DISCOVERIES.—By telegram to the Earl of Crawford's Observatory at Dunecht, M. Cruls, director of the Observatory at Rio Janeiro, announces the presence of a bright comet in the morning sky, the position of which on September 11·718 M.T. at Rio, was in R.A. 9h. 48m., Decl. − 2° 1′; it was visible to the naked eye.

On Sunday last, Mr. A. Ainslie Common, of Ealing, while observing the sun with a special telescope (reflector with glass reflecting-surfaces only), found a fine comet near the sun: nucleus bright, tail about 4′ long, and apparently much brighter at each side, giving the appearance of two tails. Mr. Common compared it for position with the sun's limbs, and from his observations we find for the comet's place at Greenwich noon, on September 17, R.A. 11h. 33m. 58·3s., Decl. + 1° 42′ 16″; the hourly motion in R.A. appeared to be + 1m. 14s., and in Decl. + 4′·5.

M. Cruls thought his comet might be the expected one of 1812, but this is certainly an oversight. Were the comet of 1812 in his observed right ascension on September 12, its declination would be much further north than that observed if the comet were approaching perihelion, and much further south if it were receding therefrom. Whether the comet detected at Rio is identical with the remarkable one discovered by Mr.